

Under the Big Sky e-Letter

November 2016



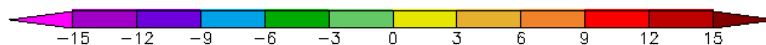
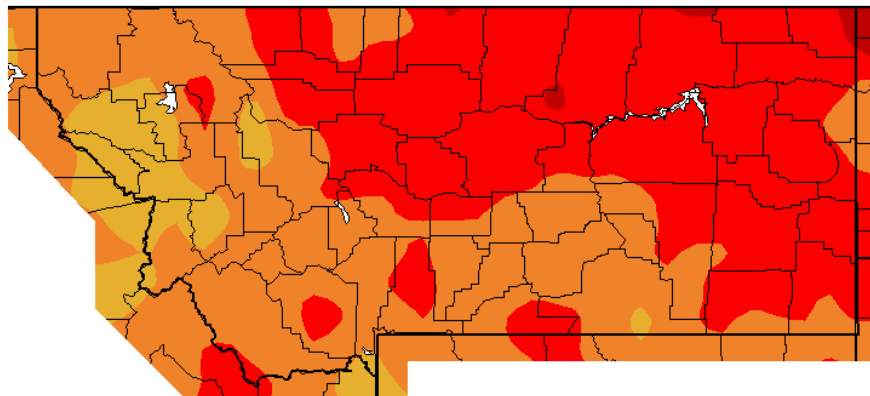
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Warm November: November 2016 will be remembered for being well above average in terms of temperature for those living in Montana. Taking a look at the average temperature that occurred over a recent 30 day period, we can see that much of the state was between 6 and 10 degrees warmer than average. While the western and southern parts of the state were slightly less warmer compared with what would be expected for the time of year, temperatures were still between 3 and 6 degrees warmer than average in many instances.

November Average Temperature Anomalies

Ave. Temperature dep from Ave (deg F)
10/30/2016 – 11/28/2016



Generated 11/29/2016 at WRCC using provisional data.
NOAA Regional Climate Centers

Figure 1: 30-day temperature anomalies across Montana depicting warmer than average temperatures.

Winter Weather Preparedness: Are You Ready?: Much of northeast Montana has already experienced its first accumulating snow to finish out the month of November, particularly locations near the North Dakota border with some places seeing in excess of 6 inches. Additional snow will be on the way to be sure throughout the season, along with bitter cold wind chills at times [Let's take some time now to discuss how you can best prepare and stay safe this winter season!](#)

Tip #1 : Know the difference between [watches, warnings, and advisories](#). These products are issued for all kinds of winter weather hazards from snow and sleet to freezing rain, as well as bitter cold wind chills. You can calculate your own wind chill [here](#).

Tip #2: Have a winter survival kit handy and [keep some safety tips in mind](#).

At home and work:

- ◇ Flashlight, extra batteries
- ◇ NOAA Weather Radio
- ◇ Extra food, water
- ◇ Extra medicine, baby items
- ◇ First-aid supplies
- ◇ Emergency heat source
- ◇ Heating fuel
- ◇ Fire extinguisher
- ◇ Smoke alarm
- ◇ Food, water, shelter for pets/animals

In Your Car:

- ◇ Mobile phone/charger
- ◇ Blankets
- ◇ Flashlight, extra batteries
- ◇ First-aid kit
- ◇ Extra clothing
- ◇ Shovel
- ◇ Windshield scraper/brush
- ◇ Tool kit
- ◇ Tow rope
- ◇ Battery booster cables
- ◇ Water container
- ◇ Compass, road maps
- ◇ High calorie, non-perishable food
- ◇ Small can, waterproof matches to melt snow for drinking water
- ◇ Knife
- ◇ For the farm/pets: Move animals to shelter, have extra feed & water.



Figure 2: Blowing snow image courtesy of Greg Forrester, Lead Forecaster at NWS Glasgow

CPC Three Month Outlook: The Climate Prediction Center released its three month outlook for temperature and precipitation for December 2016 through February 2017 on November 17, 2016. The outlook favors below average temperatures across the eastern half of Montana. Additionally, above average precipitation is expected across Montana over the three month period. This means that when all is said and done, Big Sky Country may be in for a colder and snowier than usual winter. Time will tell for sure but this is a good time to

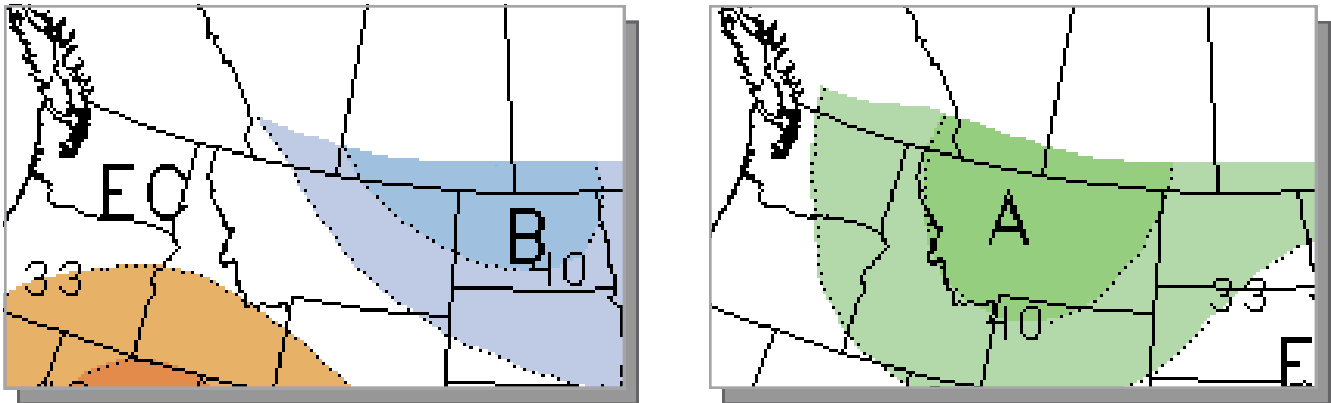


Figure 3: Climate Prediction Center three month temperature (left) and precipitation (right) outlook for December 2016 through February 2017.

look over your winter time safety tips and make sure you have your winter survival kit handy. The latest outlook is always available [here](#) for anyone curious about additional details. NOAA’s CPC official Winter Outlook was also released on October 20, 2016. It calls for cooler and wetter conditions for our area compared with normal. Check out the [release](#).

Updated U.S. Drought Monitor: The [latest U.S. Drought Monitor](#) was updated and released on Thursday November 23, 2016. Patches of abnormally dry to moderate drought conditions are continuing over western Montana. In fact, one area in extreme southeastern Montana even has severe drought conditions. There is good news, however, in that the remainder of the state is void of any dry or drought conditions. In addition,

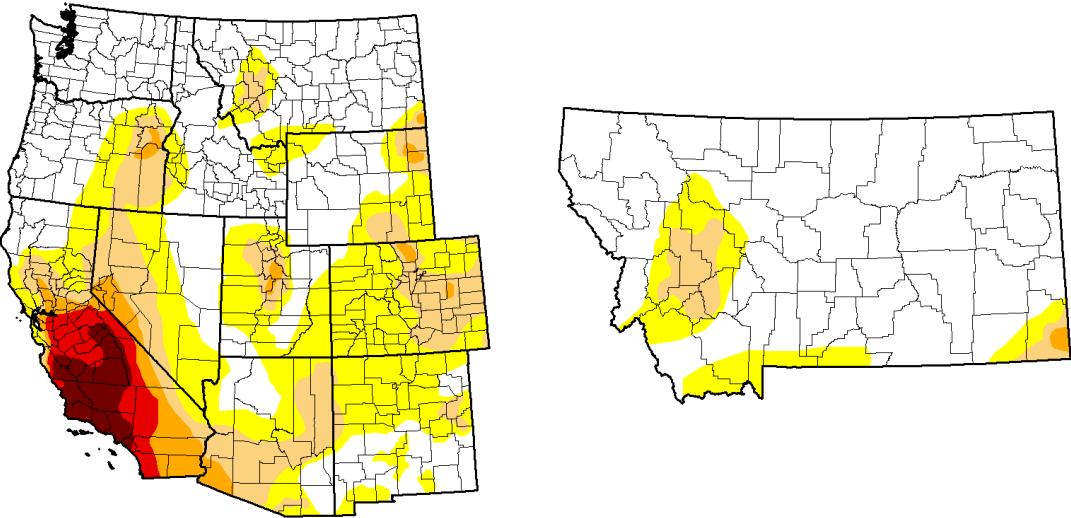
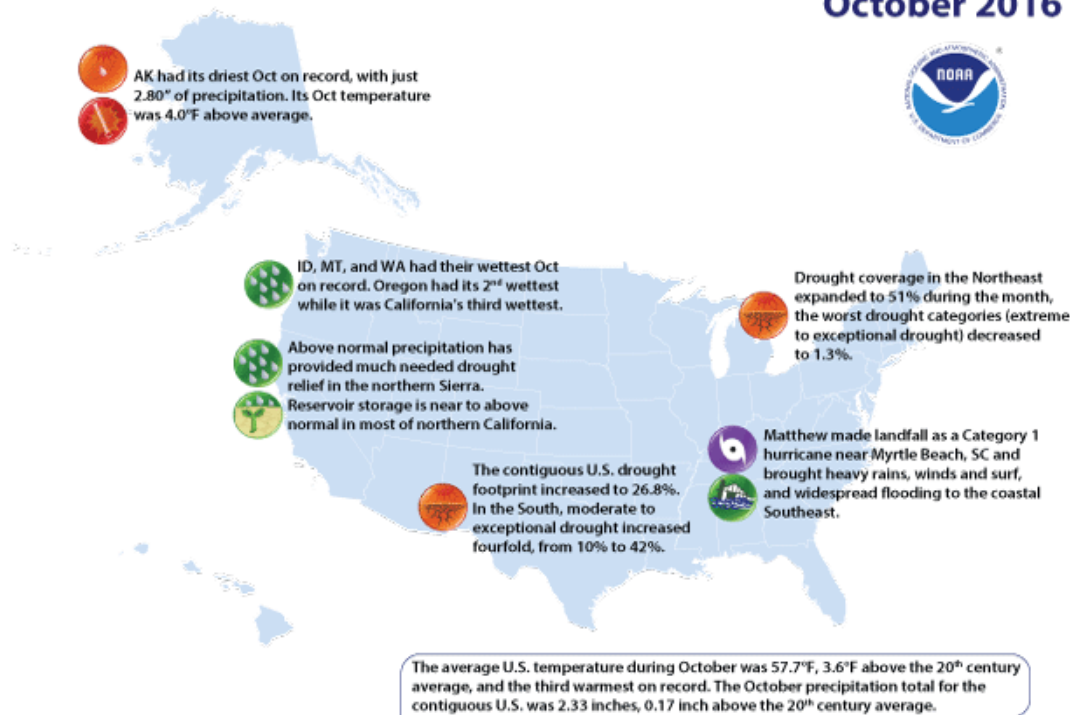


Figure 4: Latest Drought Monitor for the western U.S. (left) and Montana (right) released Thursday November 23, 2016.

if the CPC three month outlook comes to fruition, wetter than average conditions over the next three months will hopefully alleviate any drought concerns that presently exist. California continues to be the problem spot with parts of the state seeing extreme to exceptional drought.

U.S. & Global Climate Highlights (October 2016): The latest [U.S.](#) and [global](#) climate highlights for October 2016 are now available. A few points for you to take home are provided below.

U.S. Selected Significant Climate Anomalies and Events October 2016



Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncdc.noaa.gov/sotc>

Figure 5: Highlights of U.S. climate events for October 2016.

U.S. Highlights for October 2016

- 1) The contiguous U.S. average temperature for October 2016 was 57.7 °F, 3rd warmest June on record.
- 2) The October precipitation total for the contiguous U.S. came in at 2.33 inches, or 0.17 above normal.
- 3) According to the U.S. Drought Monitor, drought conditions increased from covering 19.4% of the contiguous U.S. in early October to 26.8% by the end of the month, with the most expansion occurring in the southern and southeastern part of the country.

Global Highlights for October 2016

- 1) The average temperature across global land and ocean surfaces for October 2016 tied with 2003 for the 3rd warmest October in the entire period of record.
- 2) The October globally averaged sea surface temperature was 1.30°F above the 20th century average. This is the 2nd highest global ocean temperature for October throughout the period of record.
- 3) La Niña conditions prevailed in the month of October 2016 as below average temperatures occurred throughout the eastern tropical Pacific.

October Report of Hydrologic Conditions by Greg Forrester, Lead Forecaster at NWS Glasgow:

October was a record or near record wet month across Phillips and Valley Counties. Petroleum and Garfield Counties also had well above normal precipitation with amounts between 300 and 500 percent of normal. Most of the precipitation occurred between October 2 and 4. The wet spots for the month were Port of Morgan with 6.83 inches. To the east, most areas had either near normal or slightly below normal precipitation for the month. The dry spots were Terry with 0.58 inch, Sidney 2S with 0.62 inch, and Brockway with 0.69 inch. Glasgow received 3.11 inches which was 415 percent of normal.

The heavy rain between October 2 and 4 produced flooding on the Peoples, Larb, and Beaver Creeks along with the Milk River and other small streams mainly in Phillips County. The longest lasting floods were on Beaver Creek between October 4 and 18, and the Milk River between October 5 and 15.

Temperatures were within 2 degrees of normal for the month. Glasgow averaged 58.3 degrees which was 0.1 degree above normal.

Stream flow on the Milk Rivers competed with 1986 for either record high or the second highest flow for October during the month. The Poplar Rivers had well above normal stream flow the entire month while the Yellowstone and Missouri Rivers had above normal stream flow for the entire month.

The Fort Peck Reservoir elevation rose to 2234.8 feet. The reservoir was at 80 percent of capacity and 100 percent of the mean pool.

Links You May Like:

[Climate Link with Human Evolution](#)

[Hurricane Strikes Central America in November](#)

[Coral Reefs Assaulted by Ocean Acidification](#)

[La Niña Update](#)

[Dissolving Snail Shells with Human-Caused CO2 Emissions](#)

GOES-R Launch Successful: GOES-R, NOAA's first highly advanced geostationary weather satellites, successfully lifted off from Cape Canaveral, Florida on November 19, 2016. It is expected that the new satellite will provide a large boost to the national weather observation network as well as assist in advancements in weather prediction and watch/warning issuance. The satellite will become operational within about a year from now. To read more on this milestone and what it means for weather operations in the National Weather Service, check out the full [NOAA press release](#).

Did You Know?: As November comes to a close, so does the hurricane season for the Atlantic basin. According to NOAA, the Atlantic, Pacific, and central Pacific 2016 hurricane seasons were above-normal. In fact, for the Atlantic this was the first above normal season since 2012. Out of 15 named storms, 7 went on to intensify to hurricanes and 3 major hurricanes occurred. Five of these named storms made landfall in the U.S. which is the most since 2008. Hurricane Matthew was the strongest storm and the longest lasting with maximum wind speeds reaching 160 mph, making it a category 5 hurricane. You can read more about the summary [here](#).

Precipitation Data (October 2016):

Station	Precipitation	Location
BAYM8	M	Baylor
BRDM8	2.52	Bredette
BTNM8	1.19	Brockton 17 N
BKNM8	1.1	Brockton 20 S
BKYM8	0.69	Brockway 3 WSW
BRSM8	4.09	Brusette
CLLM8	0.85	Carlyle 13 NW
CIRM8	0.96	Circle
CHNM8	2.32	Cohagen
COHM8	M	Cohagen 22 SE
CNTM8	6.38	Content 3 SSE
CULM8	1.39	Culbertson
DSNM8	M	Dodson 11 N
FLTM8	3.30	Flatwillow 4 ENE
FPKM8	1.93	Fort Peck PP
GLAM8	4.22	Glasgow 14 NW
GGWM8	3.11	Glasgow WFO
GGSM8	4.11	Glasgow 46 SW
GNDM8	0.79	Glendive WTP
GSRM8	M	Grassrange 13 NE
HRBM8	4.47	Harb
HINM8	3.58	Hinsdale 4 SW
HNSM8	5.62	Hinsdale 21 SW
HOMM8	1.97	Homestead 5 SE
HOYM8	1.17	Hoyt
JORM8	3.10	Jordan
LNDM8	0.81	Lindsay
MLAM8	6.63	Malta
MLTM8	6.80	Malta 7 E
MTAM8	5.61	Malta 35 S
MDCM8	2.03	Medicine Lake 3 SE
MLDM8	0.52	Mildred 5 N

Station	Precipitation	Location
MSBM8	4.94	Mosby 4 ENE
OPNM8	2.67	Opheim 10 N
OPMM8	2.39	Opheim 12 SSE
PTYM8	2.64	Plentywood
POGM8	6.83	Port of Morgan
RAYM8	3.43	Raymond Border Station
SAOM8	5.46	Saco 1 NNW
SMIM8	2.46	St. Marie
SAVM8	0.77	Savage
SCOM8	2.77	Scobey 4 NW
SDYM8	0.77	Sidney
SIDM8	0.62	Sidney 2S
TERM8	0.58	Terry
TYNM8	M	Terry 21 NNW
VIDM8	1.78	Vida 6 NE
WSBM8	1.99	Westby
WTRM8	5.25	Whitewater
WHIM8	5.23	Whitewater 18 NE
WBXM8	1.36	Wibaux 2 E
WNEM8	4.16	Winnett 6 NNE
WNTM8	M	Winnett 8 ESE
WITM8	4.03	Winnett 12 SW
WLFM8	0.88	Wolf Point
ZRTM8	6.03	Zortman

Monthly Trivia: Last month we asked...

What is the average seasonal snowfall in Glasgow, MT? How does that compare with the record highest and record lowest seasonal totals?

Answer: Glasgow, MT has an average seasonal snowfall of 33.1 inches. The highest amount occurred during the 2010-2011 winter with 108.6 inches. The lowest seasonal snowfall occurred in 1991-1992 when only 8.9 inches fell.



New Question: What is liquid water content (LWC) as it pertains to snow? How is this useful? How does it vary in different environments? We'll share the answers with you next month!



Figure 6: Scenic winter photo of rural roadway taken by Tanja Fransen, Meteorologist In Charge at NWS Glasgow.

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